

US EPA ARCHIVE DOCUMENT

## DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

### RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

#### Current Human Exposures Under Control

Facility Name: Chevron Cincinnati Facility  
Facility Address: Hooven, Ohio  
Facility EPA ID #: OHD 004 254 132

NOTE: This EI Determination (EID) evaluates potential current exposures of humans to site-related chemicals present in environmental media on the site and in nearby off-site areas. The site setting and a conceptual site model including potential exposure pathways are outlined in various documents that have been prepared for the site, including those listed in the references section below.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

  X   If yes - check here and continue with #2 below.

       If no - re-evaluate existing data, or

       if data are not available skip to #6 and enter "IN" (more information needed) status code.

#### **BACKGROUND**

##### **Definition of Environmental Indicators (for the RCRA Corrective Action)**

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

##### **Definition of "Current Human Exposures Under Control" EI**

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

##### **Relationship of EI to Final Remedies**

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

##### **Duration / Applicability of EI Determinations**

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”<sup>1</sup> above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

|                             | <u>Yes</u> | <u>No</u> | <u>?</u> | <u>Rationale / Key Contaminants</u>   |
|-----------------------------|------------|-----------|----------|---|
| Groundwater                 | X          |           | —        | Gasoline constituents in groundwater exceed MCLs  |
| Air (indoors) <sup>2</sup>  |            | X         | —        | Source concentration did not exceed screening criteria                                  |
| Surface Soil (e.g., <2 ft)  | X          |           | —        | PAHs, arsenic at levels exceed industrial soil PRGs                                     |
| Surface Water               |            | X         | —        | Constituents did not exceed screening criteria  |
| Sediment                    |            | X         | —        | Constituents did not exceed screening criteria  |
| Subsurf. Soil (e.g., >2 ft) | X          |           | —        | PAHs and metals exceeded industrial soil PRG  |
| Air (outdoors)              |            | X         | —        | Measured outdoor concentrations are consistent with published background concentrations |

\_\_\_\_\_ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded. X If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

\_\_\_\_\_ If unknown (for any media) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

The Chevron facility is a former Petroleum Refinery in Hooven, Ohio, near Cincinnati. The facility operated from 1933 - 1986 and during that time refined product was released into the aquifer under the site. Fourteen groundwater withdrawal and recovery wells operate to control the groundwater plume and recover hydrocarbon and have removed approximately 3.8 million gallons of hydrocarbons. A soil vapor extraction system is also in-place in the off-site area under Hooven. The facility is under a 3008(h) Administrative Order on Consent with U.S. EPA from 1993. In addition, large Solid Waste Management Units (SWMUs) primarily from petroleum waste water solids exist on the site. A Performance Agreement is in place to excavate soils at the facility and to date approximately 320,000 tons of waste has been excavated and trucked off-site. A groundwater remedy is on a separate track and the Statement of Basis on the chosen groundwater remedy is forthcoming.

**Groundwater – Yes.** Dissolved phase and free liquid phase hydrocarbon plumes are present. The results of the November/December 2004 Groundwater Sampling are in the Second Semi-annual 2004 Interim Measures Groundwater Report, dated August 29, 2005. The report indicates Light Non Aqueous Phase Liquid (LNAPL) thickness in monitoring wells range from 0.01 to 1.50 feet in thickness on-site, and a range of 0.14 to 0.28 feet in thickness off-site. Results of dissolved phase sampling from the above referenced report indicates benzene results of 7 to 17 ug/L (ppb) on-site, and 2 wells off-site had benzene concentrations of 580 and 810 ug/L (ppb). Other volatile organic results are compared to MCLs in the table below.

| Groundwater Constituent | Maximum Conc. (ppb) |         | MCL (ppb) |
|-------------------------|---------------------|---------|-----------|
|                         | Onsite              | Offsite |           |
| Benzene                 | 17,000              | 810     | 5         |
| Ethylbenzene            | 1,900               | 1,500   | 700       |
| Toluene                 | 680                 | 51      | 1000      |
| Xylenes Total           | 8,600               | 610     | 10,000    |

**Air (indoors) on-site – No.** Results from the November/December 2004 Groundwater Sampling are in the Second Semi-annual 2004 Interim Measures Groundwater Report, dated August 29, 2005. This report shows results of the nearest well (Production Well -21) to the occupied building with a basement on-site (Red Square Building) the groundwater has a level of benzene at 1.50 ppm. This concentration does not exceed the industrial ASTM enclosed space vapor inhalation criteria of 7.66 ppm. The other volatile constituents in the dissolved plume from production well did not exceed the conservative residential indoor air screening criteria. However, there is another scenario that does not use dissolved concentrations in groundwater wells as a screening number this is when LNAPL appears in the groundwater wells. When groundwater levels drop below the impacted areas, LNAPL appears in the wells and is exposed. The LNAPL will then be exposed to the air in the pore spaces of the aquifer and becomes a potential source for volatile compounds in indoor air. The conservative modeled concentration with an assumption of LNAPL present throughout the year estimated an indoor benzene concentration exceeding the acceptable risk limit. Site-wide groundwater investigation however shows that LNAPL is present only a small percentage of the year. In addition, the actual concentration of benzene ( $3 \text{ ug/m}^3$ ) measured in indoor air was similar to that of background benzene concentrations.

**Air (indoors) off-site – No-** The Report titled *"Subsurface Investigation Field Activities Report and Human Health Risk Assessment"* (2005) presents an evaluation of potential exposure to indoor air impacts emanating from the groundwater/LNAPL plume at residences and the elementary school located in Hooven, Ohio. The analytical data from the vertically nested wells show that the petroleum hydrocarbon constituents detected in vapor samples immediately above LNAPL and dissolved plume attenuate with in a short distance above the groundwater table and do not reach ground surface. The attenuation is attributed to active biodegradation as shown from oxygen and carbon dioxide profiles in the plume area. Further, the soil gas concentrations of constituents identified in the LNAPL/dissolved contaminant plume are below the generic screening levels in Table 2b of the Office of Solid Waste and Emergency Response (OSWER) draft Vapor Intrusion (VI) guidance at depths shallower than 30ft- below ground surface (bgs) in all the nested wells inside the plume. In accordance with the OSWER draft VI guidance, the vapor migration pathway from LNAPL or dissolved plume to indoor air is considered incomplete.

**Surface Soils- Yes** - Surface soils at the Chevron facility are contaminated with the inorganics arsenic, chromium, and lead; and the semi-volatiles benzo(a)anthracene, benzo(a) pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, ideno(1,2,3-cd)pyrene, and phenanthrene. These contaminants are above the region 9 PRGs for industrial soil at some of the sample locations on the site.

**Subsurface Soils – Yes-** Subsurface soils for at the Chevron facility are contaminated with the inorganics arsenic, and lead; the semi-volatiles 1-methylnapthalene, 2-methylnapthalene, benzo(a)anthracene, benzo(a) pyrene, benzo(b)flouranthene, dibenz(a,h)anthracene, napthalene; and the volatile organic benzene. These contaminants are above the region 9 PRGs for industrial soil at some of the sample locations on the site.

**Air (outdoors) – No.** Ambient outdoor air concentrations are measured as part of the soil cleanup in three different locations at the Chevron Site, upwind and downwind samples are collected. Ambient air samples were also collected as part of offsite field investigation in the town of Hooven in 2005. Measured outdoor concentrations of BTEX and other components of gasoline onsite and offsite are consistent with published background concentrations.

Footnotes:

<sup>1</sup> "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

<sup>2</sup> Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

| <b>“Contaminated” Media</b>   | <b>Residents</b> | <b>Workers</b> | <b>Day-Care</b> | <b>Construction</b> | <b>Trespassers</b> | <b>Recreation</b> | <b>Food<sup>3</sup></b> |
|-------------------------------|------------------|----------------|-----------------|---------------------|--------------------|-------------------|-------------------------|
| Groundwater                   | <u>N</u>         | <u>N</u>       | <u>N</u>        | <u>Y</u>            | <u>N</u>           | <u>N</u>          | <u>N</u>                |
| Air (indoors)                 |                  |                |                 |                     |                    |                   |                         |
| Soil (surface, e.g., <2 ft)   | <u>N</u>         | <u>Y</u>       | <u>N</u>        | <u>Y</u>            | <u>Y</u>           | <u>N</u>          | <u>N</u>                |
| Surface Water                 |                  |                |                 |                     |                    |                   |                         |
| Sediment                      |                  |                |                 |                     |                    |                   |                         |
| Soil (subsurface e.g., >2 ft) | <u>N</u>         | <u>N</u>       | <u>N</u>        | <u>Y</u>            | <u>N</u>           | <u>N</u>          | <u>N</u>                |
| Air (outdoors)                |                  |                |                 |                     |                    |                   |                         |

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated”) as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“\_\_\_”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- \_\_\_ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- X If yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.
- \_\_\_ If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code

Rationale and Reference(s):

**Groundwater –No for human receptors other than construction/remediation workers-** Site related contaminants have been found in on-site and off-site groundwater, but water supply wells in the area have not been affected. There are no residential wells in the impacted offsite location and drinking water in the area is supplied from a clean source from an aquifer in the next valley west. Residents are not expected to come in to direct contact with contaminated groundwater since the water table is at the depth of 55 ft bgs. However, the water table is intercepted at a depth of 15ft bgs onsite and therefore construction or remediation workers at the site can come in contact with groundwater during excavation of SWMUs during the soils cleanup activity or trenching activity.

**Surface Soil- Yes for on-site workers, construction workers, and trespassers -** Current receptors include workers engaged in site remediation, construction workers, and possible site trespassers. Trespassers may be exposed to surface soil . Currently, the site is not used for recreation, and potential exposures from off-site recreation are negligible. There is no daycare facility at the site.

**Subsurface Soil – Yes for construction/Remediation workers -** The construction or remediation workers at the site can contact the subsurface soils as they do excavations at the site.

<sup>3</sup> Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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- 4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be “**significant**”<sup>4</sup> (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

  X   If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

       If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

       If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

Rationale and Reference(s):

**Groundwater : Construction/Remediation workers**

Impacted groundwater is pumped and treated as a part of containment and remediation systems, but the groundwater is managed in a controlled environment and workers wear appropriate personal protective equipment, as outlined in the site Health and Safety plan, as needed. Soil remediation workers and construction workers at the site have proper personal protective equipment in line with their health and safety plans to prevent contact with the contaminated groundwater.

**Surface and subsurface Soil : Construction /Remediation workers**

The Report titled “*Chevron Cincinnati Facility Phase II RFI Facility-Wide Risk Assessment*” (E & E 2000) quantitatively evaluated the following future scenarios: future construction/remediation worker to surface soil (comparable to current worker exposures), was calculated using a Reasonable Maximum Exposure (RME) case for cancer risk. The risk was calculated to be 1.5E-06 for soil ingestion; 1.7E-06 for soil dermal contact; 1.9E-06 for particulate/dust inhalation; and 1.7E-07 for inhalation of volatiles. The lifetime excess cancer risk for the combined exposure pathways for this scenario is 5.3E-06 and lies within the EPA’s accepted risk range of 1E-04 to 1E-06. The non-cancer hazard due to the exposure from these cumulative exposure pathways is less than one.

**Surface soil: Trespassers**

The trespasser scenario involves a time frame of exposure that is less than the construction/remediation worker scenario and the risks calculated would be less. The only comparable scenario from the report titled “*Chevron Cincinnati Facility Phase II RFI Facility-Wide Risk Assessment*” (E & E 2000) is the adolescent recreator. The adolescent recreator can be a surrogate for the trespasser scenario. The RME risks for cancer calculated for the adolescent recreator scenario are 3.4E-07 for soil ingestion, 1.1E-06 for soil dermal contact; 1.8E-10 for soil particulate inhalation; and 1.8E-07 for volatile inhalation. The lifetime excess cancer risk for the combined exposure pathways for this scenario is 1.9E-06 and lies within the EPA’s accepted risk range of 1E-04 to 1E-06. The non-cancer hazard due to the exposure from these cumulative exposure pathways is less than one.

<sup>4</sup> If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

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5 Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

\_\_\_\_\_ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

\_\_\_\_\_ If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

\_\_\_\_\_ If unknown (for any potentially “unacceptable” exposure) - continue and enter “TN” status code

Rationale and Reference(s):

No “significant” exposures. See response to questions 4 above.

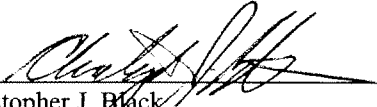
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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):


  X   YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Chevron Cincinnati facility, EPA ID #OHD 004 254 132, located at Hooven, Ohio under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

       NO - "Current Human Exposures" are NOT "Under Control."

       IN - More information is needed to make a determination.

Completed by (signature)   
(print) Christopher J. Black  
(title) RCRA Corrective Action Project Manager

Date 9/22/05

Supervisor (signature)   
(print) George Hamper  
(title) Chief, RCRA Corrective Action Section  
(EPA Region or State) U.S. EPA Region 5 Chicago

Date 9-22-05

*Bhooma Sundar*

Locations where References may be found:

US EPA 77 W. Jackson Chicago IL -7<sup>th</sup> Floor Records Center

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**FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.**



REFERENCES:

Ecology and Environment, Inc. (E & E), 1998, *Chevron Cincinnati Facility Risk-Based Prioritization*, June 1998.

E & E, 2000, *Chevron Cincinnati Facility Phase II RFI Facility- wide Human Health and Ecological Risk Assessment*, Revision 1, August 2000.

Civil & Environmental Consultants, Inc. (CEC), 2001, *Environmental Indicators Documentation, Migration of Contaminated Groundwater Under Control*, Cincinnati, OH.

TriHydro, June 30, 2005, *Subsurface Investigation Field Activities Report and Human Health Risk Assessment Chevron Cincinnati Facility, Hooven, Ohio, Revision 0*

TriHydro, August 29, 2005, *Second Semi-annual 2004 Interim Measures Groundwater Monitoring Report*.